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**PHYSICO-CHEMICAL AND MINERALOGICAL CHARACTERISTICS OF
RUDUA SOIL SERIES**

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PHYSICO-CHEMICAL AND MINERALOGICAL CHARACTERISTICS OF RUDUA
SOIL SERIES

by

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This project report entitled 'Physico-Chemical and Mineralogical Characteristics of Rudua Soil Series' is prepared by Norakmal Binti Khairuanuar; matric no. 164876 and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Agricultural Science.

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ABSTRACT

Sandy soils are known to have low soil fertility level and less suitable for agriculture purposes. However, in Malaysia, the distributions of sandy soils are huge especially at the coastal area of Peninsular Malaysia. The soils in this area are locally known as Beach Ridges Interspersed with Swales (BRIS) soils. The characteristics of these soils include low percentage of clay content, high porosity, high leaching, low water retention and lack of soil nutrients which makes it less favorable for crops to grow and survive. As it covered a large area of coastal area of Peninsular Malaysia, government has now encouraged farmers to develop these soils mainly for agriculture purposes. Hence, a study was conducted to determine the physico-chemical properties and mineralogy of these soils which is by taking different soil depth of Rudua Soil Series as treatments. The study area was located in the Kelantan-Terengganu Coastal Plains, Peninsular Malaysia which is started from Bachok, Kelantan (in the north) to Merang, Terengganu (in the south). The Rudua Soil Series was identified and soil samples from four different soil depths were dug and brought to laboratory for further analysis. The physical properties, chemical properties and mineralogy identification analysis were carried out. The presences of light and heavy minerals in the soil were also determined. The results obtained show least different on physical properties as the sand contents were high. Whereas for chemical properties, the soils show an improvement. These are mainly caused by the application of fertilizer and additional of organic matter into the soils. As for the mineralogy identification, the minerals that are found in these soils are quartz, lepidocrocite, hematite, kaolinite, muscovite, microline, and variscite.

ABSTRAK

Tanah berpasir adalah terkenal sebagai tanah mempunyai tahap kesuburan tanah yang rendah dan tidak sesuai untuk tujuan pertanian. Walau bagaimanapun, di Malaysia, pengagihan tanah berpasir adalah besar terutamanya di kawasan pesisiran pantai di Semenanjung Malaysia. Tanah di kawasan ini adalah lebih dikenali sebagai tanah BRIS (Beach Ridges Interspersed with Swales) . Ciri-ciri tanah ini termasuklah mempunyai peratusan kandungan tanah lempung yang rendah, kadar poros yang tinggi, larut lesap tinggi, keupayaan pengekalan air yang rendah dan kekurangan nutrien tanah di mana menjadikan tanah ini sebagai tanah yang kurang sesuai untuk tanaman berkembang dan terus hidup. Kerana ia meliputi kawasan yang besar di kawasan pantai di Semenanjung Malaysia, kerajaan kini telah menggalakkan petani untuk membangunkan tanah ini terutamanya untuk tujuan pertanian. Oleh itu, satu kajian telah dijalankan untuk menentukan sifat-sifat fizik-kimia dan mineralogi tanah ini iaitu dengan mengambil kedalaman tanah yang berbeza dan Tanah Siri Rudua sebagai rawatan. Kawasan kajian terletak di kawasan pantai Kelantan-Terengganu, Semenanjung Malaysia yang bermula dari Bachok, Kelantan (di utara) sehingga ke Merang, Terengganu (di selatan). Tanah Siri Rudua telah dikenal pasti dan sampel tanah dari empat kedalaman tanah yang berbeza telah digali dan dibawa untuk analisis lanjut. Ciri-ciri fizikal, kimia dan pengenalan mineralogi analisis telah dijalankan. Kehadiran mineral berat dan ringan di dalam tanah juga telah ditentukan. Keputusan yang diperolehi menunjukkan perbezaan yang tidak ketara pada ciri fizik tanah iaitu seperti kandungan pasir yang masih tinggi. Manakala bagi sifat-sifat kimia tanah, keputusan yang diperolehi menunjukkan sedikit

peningkatan. Hal ini adalah disebabkan oleh penggunaan baja dan tambahan bahan organik ke dalam tanah. Bagi kandungan mineral dalam tanah, keputusan analisis menunjukkan kehadiran mineral tanah seperti quartz, lepidocrocite, alkohol, kaolinit, moscow, microline, dan variscite.



CHAPTER 1

INTRODUCTION

The soils in the beach ridges are locally known as BRIS (Beach Ridges Interspersed with swales) soils due to the nature of their properties and distribution in the coastal landscape (Roslan *et al.*, 2010).

The BRIS soils are also known to be an infertile soil. These soils are found to be excessively-well drained and too sandy which make it intolerances to most of crops in Malaysia. Physically, the textures of these soils are sandy which contains >95% of sand (Roslan *et al.*, 2010) and this make the porosity of this soil is high. Thus these soils are less preferable towards most crops.

However, large areas of Peninsular Malaysia are being covered by the soils which make it such a waste if these soils are being ignored. The BRIS soil covered about 121,405 hectares of coastal area of Kelantan, Pahang and west coast of Johor (Muhammad *et al.*, 2009). Because of that, the government really encourages the farmers and also the agricultural specialists to develop this soil area mainly for economic proposes.

Previously, in the coastal zone of Kelantan-Terengganu Plains, the soils were utilized for growing of tobacco after combining and improving them with waste products (Roslan *et al.*, 2010). Tobacco is the most preferred crops for the farmers as this crop is very economical and has a high demand in the marketplace. However, growing tobacco noted to be less eco-friendly.

Thus, Malaysian government has now encouraged farmers to replace the tobacco with other eco-friendly and economical crops, such as, kenaf. Other than kenaf, chili, yam, bean, and sweat potato are also suitable to be grown in BRIS soil. Even though the crop production on the BRIS soils requires high amount of fertilizers and proper irrigation system, but with a good management practices these crops can be grown with success (Zaharah *et al.*, 1992).

However, it is not an easy task to convince farmers to replace tobacco with kenaf due to its economic significant in the marketplace. An acceptable agronomic package for kenaf production should be put in place before farmers are asked to grow this crop (Roslan *et al.*, 2011).

A study on soil chemical, physical and mineralogical properties can help in identifying the problems faced by these soils. Thus, a good agricultural practice can be put forward that is well suited to alleviate BRIS soil infertility problem for crop productions.

1.2 Objectives

This study was conducted and mainly focused on the chemical, physical and mineralogical properties of one of the Beach Ridges Interspersed with Swales (BRIS) soils which is Rudua soil series. Basically, the objectives of this study were:

- i. To study the physical and chemical characteristics of Rudua Soil Series.
- ii. To study the mineralogical characteristics of Rudua Soil Series.
- iii. To study the light and heavy minerals of Rudua Soil Series.

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